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The Determinants of Adoption of Digital Terrestrial Television for Marginalized Groups: The Deaf Community

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ABSTRACT

Digital switchover is the term used for the digital migration process from analogue to digital broadcasting. The purported benefits include: increased robustness and technical quality, high-definition television and increased channel capacity. The success of digital switchover is dependent on the voluntary adoption by consumers, including marginalized groups such as the disabled which are often neglected. Researchers have posited the need to understand these groups separately in order to spur diffusion and adoption. This paper is a work-in-progress, and its purpose is to re-iterate the need for segmentation and also to examine theories that can be used as insights on the determinants of DTTV adoption for the deaf community. It proposes a quantitative and qualitative approach for data collection. It is anticipated that research of this nature will help to advise regulators on the strategy to improve the uptake of DTTV to these marginalized groups.

Keywords

Digital Terrestrial Television (DTTV), Digital Switchover (DSO), Adoption, Diffusion, Deaf, Jamaica

INTRODUCTION

DSO is the term used for the digital migration process; involving a gradual replacement of analogue broadcasting (transmission and reception) by digital broadcasting (transmission and reception) (Lefort, Létang, Marlier, Harold, & Renaud, 2002). The new TV broadcast is called DTTV. DTTV along with digital cable TV, satellite TV on Internet based TV are various platforms for accessing digital TV.

DTTV allows more efficient use of spectrum with several channels using the same amount of spectrum as a single analogue channel. In addition, it's possible to offer higher picture and sound quality to viewers; including Dolby surround sound which makes TV watching more immersive (Spanswic, 2010). It is expected that digital TV will allow consumers to do much more than simply watch TV. Many observers are looking towards social TV as the next killer application, something from which operators could derive new revenue streams. According to the Association of International Broadcasting (AIB) many operators are now looking at ways to incorporate Facebook and Twitter onto their digital TV platforms using widgets, and consumer electronics manufacturers are building TVs with in-built internet protocol connectivity that will permit a whole range of new services to be developed (Spanswic, 2010).

The International Telecommunications Union agreed, at the Regional Radio Conference in 2006, that by 17 June 2015 all countries should have completed their transition from analogue to digital transmission. The current implementation status by country shows a bias towards wealthy countries. Countries like the USA, UK, France, Australia, Spain, Italy, Japan, Germany and Netherlands are quite advanced in their implementation and if they have not yet done so, will make the 2015 deadline. Most other countries will not; Vietnam's implementation date is 2020, Tajikistan is 2025 and the CEO of AIB has declared that Latin and Central America will not make the deadline (Spanswic, 2010).

The pivotal point is that majority of the efforts used by the wealthier countries were based on allowances/subsidies/equipment and installation being provided. For example in, the UK Government indicated it would

offer assistance by means of the Digital TV Help Scheme. This scheme is targeted to people aged 75 years and over and disabled persons, individuals in care homes for more than 6 months and others.

It is expected that developing countries will be embarking on DSO absent elaborate incentives. Baseline marketing efforts alone will not be sufficient. Hence a research focusing on what would persuade as many persons as possible to accept this technology is necessary. The perceived attributes and behavioural intention to use DTTV needs to be assessed in order to find the determinants that will allow high voluntary up-take.

Based on the above discussion the world is at the cusp of the digital TV revolution, a revolution that is pregnant with possibilities for broadcaster, cable companies and the consumer. While there are massive possibilities, with widespread impact on all consumers, we have seen very little academic research on the determinants for DSO. Of the sparse literature on DSO there are two issues that are clear from the consumers' perspective. First it is generally accepted that the success of any DSO strategy is dependent on the voluntary adoption of digital TV by consumers (Starks, 2007). The consumer market is inclusive of several groups of individuals ranging from varying income groups, youth, elderly, disabled, etc. The second point, made by Ofcom Consumer Panel (2004), is that vulnerable and or marginalized groups such as the elderly, and the disabled should be targeted and marketed to separately to increase diffusion among these groups. While these two points have been made and research has been done generally on the adoption and customer intention to use DTTV, the literature is however silent on what are the determinants for the adoption of DTV by marginalized groups.

With Jamaica already set to play a leading role in DSO in the Caribbean (Jamaica Information Service, 2008) this research can create an exemplary and replicable model for use in DSO projects by fellow Caribbean countries and similar developing countries such as those in Latin and Central America. It is anticipated that the findings from this research will be instrumental for piloting DSO feasibility research and public policy making in countries with similar socio-economic and infrastructural factors.

The purpose of this study is to investigate the determinants of DTTV adoption for marginalized groups. This is an initial study starting with the deaf population in Jamaica that can be replicated for other marginalized groups. The research will answer the following questions:

1. What are the determinants of DTTV adoption specifically for the deaf community?
2. What is the impact and relevance of each determinant?
3. How can the negative determinants be mitigated and the positive determinants leveraged to increase voluntary take-up?

It is anticipated that the findings will help to advise regulators on strategies to improve the uptake of DTTV to marginalized groups. It will also help to advise marketers on strategy, communications channel, placement, and content in reaching these groups.

The rest of the paper is structured as follows. First we will discuss the literature review which entails a brief examination of Jamaica's DSO status, followed by an overview of the deaf community in Jamaica, market segmentation, then an examination of the diffusion of innovation literature. Then, the methodology will outline the research plan followed by a conclusion. It is important to note that this is a work-in-progress paper.

LITERATURE REVIEW

Digital Switchover in Jamaica

In 2010, the Jamaican Government regulator, the Broadcasting Commission announced, that 2015 is the nation's target date for DSO. They began forging ahead with plans on the premise that if Jamaica takes too long in making the shift, it runs the risk of being placed at an economic disadvantage and may end up on the wrong side of the digital divide. The influential Media Association of Jamaica (MAJ) which lobbies and advocates on behalf of the local electronic media has stated that while they are in agreement that DSO is necessary, they are not in agreement with the deadline/timeframe of 2015 (Jamaica Observer, 2010). Among the issues they have mentioned is the cost of switching in such a short time.

An argument was made for postponing DSO in developing countries at the Commonwealth Broadcasting Association (CBA) Asia-Pacific regional conference. The reasons cited by the CBA include lack of consideration for countries where: (a) TV ownership is limited, (b) consumer spending power is low, and (c) governments and public agencies have much more urgent development priorities (Starks, 2010).

On the technical side there is a disagreement on what technology standard to use. In Europe and much of Asia, the Pacific and parts of Africa Digital Video Broadcasting (DVB) is the system of choice. Advanced Television System Committee (ATSC) standard is used in the USA, Canada, Mexico and South Korea. Integrated Services Digital Broadcasting (ISDB) is

used in Japan. Digital Multimedia Broadcasting (DMB) is the standard chosen by China, and will extend to the Special Administrative Regions of Hong Kong and Macau. Interestingly, some observers have stated that DMB is perhaps the best of all four digital TV standards as it works extremely well with both fixed and mobile receivers, allowing consumption on the move (Spanswic, 2010). The main technical issue that media providers in Jamaica are grappling with is the choice of a standard; DMB which is also the least expensive or ATSC which is the American standard. Argument for the latter is based on the fact that most of the program shown on local TV and subscriber TV are US made, and that hardware would be easily available based on proximity.

On the consumer side, the Broadcasting Commission has indicated that it is unlikely that the government will be subsidizing set-top boxes or digital TV purchases to facilitate the switch. The DSO mandate was a topic of interest at a recent workshop, dubbed 'Managing the Transition from Analogue to Digital Broadcasting', in December 2010. Attendees which included key industry stakeholders from Spectrum Management Authority, the Broadcasting Commission, Cable TV providers and Broadcasters were unanimous in their projection of resistance from consumers if they are asked to spend their personal funds for a government mandated switch.

The Deaf Population in Jamaica

The proposition of this study will be tested within the deaf/hard of hearing community in Jamaica. In the last census taken by The Statistical Institute of Jamaica in 2001, it was reported that there is a total of 2,985 and 4,085 deaf male and female respectively. Of the respective totals 14.44% and 8.94% are male and female children respectively (under 14 years) and 4.56% and 3.92% are male and female teenagers respectively (above 14 years). The Jamaican hearing impaired community learns Jamaican Sign Language (JSL) as their first language, which is different from, but is heavily influenced by American Sign Language (ASL), the alphabet used is from the ASL, and most persons then learn English as their second language (Social Services Department Representative from Jamaica Association for the Deaf, personal communication, February 23, 2011).

Marketing, Marketing Segmentation and Digital Terrestrial Television Adoption

An integral aspect in the conversion to DTTV is the willingness of individuals to adopt especially in environments where the uptake is voluntary and users are expected to bear the cost. In this regards, we propose the research community should actively examine factors affecting diffusion and adoption of DTTV. In addition we argue that agencies that drive adoption should not take a 'mass marketing' approach, but rather examine and as a result appeal to different segments of the market accordingly. This approach is even more important with the increase in influence of social network and its propensity for target marketing.

Marketing of any product or service encompasses a set of activities. A media studies program, Introduction to Marketing at Wrotham School Kent UK highlighted these activities as: (1) getting your potential customers' attention, (2) motivating them to buy, (3) getting them to actually buy and (4) promote continuous purchasing. There is some level of collaboration between the aforementioned steps and Rogers' Innovation Diffusion theory (IDT). IDT is one of Everett Rogers four main theories that deal with diffusion of innovations (DOI) (Rogers, 1995). IDT is a valuable perspective for observing themes and frameworks on IT evaluation/assessment, adoption and implementation (Fichman, 1992). The innovation diffusion process is the route through which an individual or decision making unit moves from the initial knowledge of an innovation, to forming an attitude towards the innovation, to making a decision to adopt or reject, to implementation of the new idea and to confirmation of the decision (Rogers, 2003, p. 168). Hence, aspects of the marketing process and DOI are complementary.

The analogue-digital TV switchover is an ambitious programme of social and technical change (Damodaran, 2002). The human aspect of this change/adoption is a paramount focus to the success of this ambitious goal. Social marketing incorporates this focus. It offers a consumer centered approach and demands a thorough, well researched understanding of the target market, specifically their knowledge, attitudes and behaviors relevant to the change at hand (Jones, Rees, Hall, & Tang, 2005). Jones et al. (2005) describe market segmentation as the process of dividing the target market into groups to better understand their current behaviours, evaluating each segment and selecting target segment(s) and then developing an appropriate marketing mix for those segments which includes developing messages and tailoring programs to meet their specific needs.

Some researchers have examined the human aspect of DSO, typically characterizing the market based on the nature of adopters based on their tendency to adopt at specific time periods in the evolution of the technology/system/innovation (Damarodan, 2002; Klein, Karger, & Sinclair, 2004). The segments used by Damodaran (2002) relate to Rogers' category of adopters: early adopters, early majority, late majority and laggards. It is posited that marketing and communications strategies must be adapted depending on the nature of, the expectations and behavior of each of the broad segments.

There is sparse research on consumer attitudes, motivations and needs in DSO categorized based on the specific needs of the marginalized groups. Klein et al. (2004) made efforts to identify six key segments for the UK viewing population, see Table

1. They expanded the ‘adopter’ segment to include 3 elements (a) comfortable adopters (b) marginalized adopters (c) experimental adopters, followed by (d) ‘could be’ segment, then the ‘won’t be’ segment which was further broken down into (e) ‘passive won’t be’ and (f) active ‘won’t be’. On this premise, they argue that consumers make up their minds about DTV by looking at three different levels – platform symbolism, content attractiveness and equipment practicality – which are arranged hierarchically in three levels respectively. In the hierarchy, people must be satisfied with a lower level in order to progress to the next level up. It was recommended that the above segments should be considered by government when implementing its switchover plans, noting that the groups are not static (Klein et al., 2004).

	Adopter			Could Be	Won't Be	
	Comfortable Adopter	Marginalized Adopter	Experimental Adopter		Passive Won't Be	Active Won't Be
Equipment Practicality			●	●		
Content Attractiveness			●	●●	●	●
Platform Symbolism		●		●	●●	●●●

Key: Blank - Not a key target for intervention
 ● - Low level of intervention should be considered
 ●● - Priority for government attention

Table 1. Segments used in mapping of intervention priorities (Klein et al., 2004)

Other researchers in considering groups affected by DSO have begun to look at vulnerable groups as a whole. As mentioned in the introduction, a group that is seemingly neglected in the marketing efforts or segmentation is the disabled community. For example, Springett and Griffiths (2007) noted that the rush to deliver digital TV may have resulted in failure to account for the visually disabled. In general, disabled persons participation in his or her community and society at large can be significantly different than that of a non-disabled person. Disabled individuals face many types of educational, economic, social and technological barriers to full engagement in society. Ofcom Consumer Panel (2004) notes that these vulnerable groups may have particular problems to overcome in adopting digital TV and risk losing TV services altogether if they lack an adequate support network to help them through the practical process of adoption. From previous studies some identified marginalized groups are the disabled, the aged and those with reduced English literacy. Ofcom Consumer Panel (2004) reports on these segments as follows; (a) Disability which includes sensory disability (visual and hearing impairments), cognitive or learning disability and physical disability (b) Age which concerns the elderly but challenges for the elderly are often compounded by the co-occurrence of different kinds of vulnerability which, when taken together, may lead to social isolation and (c) Persons with reduced English literacy; people who have low literacy development and people for whom English is not their first language.

These barriers, can to some extent, be bridged in diffusion with the specialized target marketing (Baker & Bellordre, 2003). In essence, segmentation of target markets aids in grouping individuals with commonalities as well as offering a greater understanding of wants, needs, barriers and behaviours (Jones et al., 2005). The proposed market segmentation for DSO is two-fold; first the most vulnerable groups in society as the target segments and within these segments target persons from the five categories of adopters.

The Application of Information System Theory

Technology Acceptance Model

A well-known model for technology acceptance and use is the Technology Acceptance Model (TAM), originally proposed by Davis in 1986, see Figure 1. TAM provides a basis with which one traces how external variables influence belief, attitude, and intention to use (Park, 2009). Two cognitive beliefs are posited by TAM: perceived usefulness (PU) and perceived ease of use (PEOU). PU is the individual's assessment of the utility offered by using new information technology in a specific context while PEOU refers to the degree to which the user expects the target system to be free from effort (Li & Huang, 2009). PU is a primary belief factor, and PEOU is a secondary belief factor. Several empirical studies have found that TAM consistently explains, on average, 40% of the substantial proportion of the variance in usage intentions and behavior, and that

TAM compares favorably with alternative models such as the theory of reasoned action (TRA) and the theory of planned behavior (TPB) (Venkatesh & Davis, 2000).

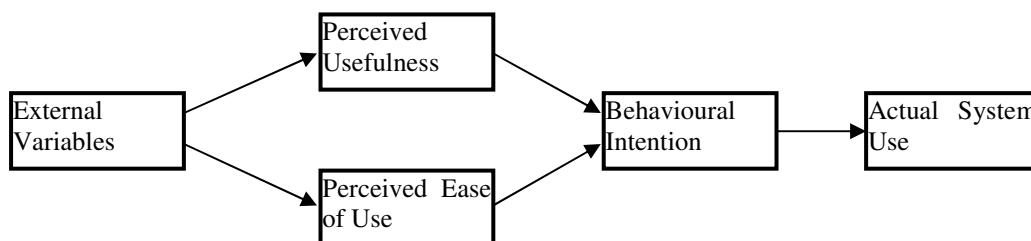


Figure 1. Technology acceptance Model (Venkatesh & Davis, 1996)

TAM has been continuously studied and expanded. One of the major upgrades is the Unified Theory of Acceptance and Use of Technology (UTAUT). For this research the model to be employed will be based on the UTAUT. Venkatesh, Morris, Davis and Davis (2003) created this synthesized model to present a more complete picture of the acceptance process than any previous individual model had been able to do. The intent is to modify this model to include determinants specific to the deaf community..

Eight models previously used in IS literature were merged in an integrated model, all of which had their origins in psychology, sociology and communications. These eight models are the TRA, TAM, TPB, the Motivational Model (MM), the combined TAM and TPB (C-TAM-TPB), the Model of PC Utilization (MPCU), DOI and Social Cognitive Theory (SCT). Each model attempts to predict and explain user behaviour using a variety of independent variables. A unified model was created based on the conceptual and empirical similarities across these eight models (AlAwadhi & Morris, 2008).

By consolidating and improving upon existing IT acceptance models, it is argued that the UTAUT model should now serve as a benchmark for the acceptance literature. The UTAUT model is relatively new but its suitability, validity and reliability in technology adoption studies in different contexts has been proven (AlAwadhi & Morris, 2008).

UTAUT aims to explain user intentions to use an information system and subsequent usage behavior, see Figure 2. The theory holds that four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are direct determinants of usage intention and behavior (Venkatesh et al., 2003). Performance expectancy is comparable to Perceived Usefulness (PU) and effort expectancy to Perceived Ease of Use (PEOU). Performance expectancy, effort expectancy, social influence, and facilitating conditions can be viewed as perceived attributes and gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behaviour (Venkatesh et al., 2003).

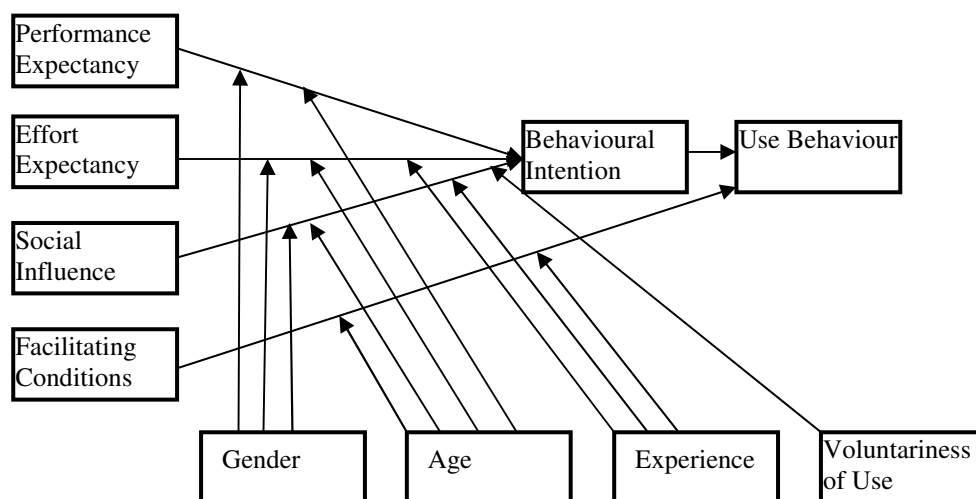


Figure 2. Unified Theory of Acceptance and Use of Technology Model (Venkatesh et al., 2003)

Use of UTAUT and DOI to Identify Determinants to Technology Acceptance

Robinson (2009) highlights three valuable insights from DOI theory/models; (1) what qualities make an innovation spread successfully (2) the importance of peer-peer conversations and peer networks and (3) understanding the needs of different user segments. Insight 1 is more related to the design of the product/technology. The four key constructs of the UTAUT use point 2 and 3 aforementioned as explained below;

- The importance of peer-peer conversations and peer networks is considered in the social influence construct. The importance of social influence was highlighted by Coleman, Katz and Menzel (1966) in the study on the diffusion of tetracycline. Social influence covers the individual innovativeness theory, who adopts the innovation and when. All persons in society as a whole and in vulnerable consumer groups fall in a peer-to-peer network and engage in peer-to-peer conversations.
- Understanding the needs of different user segments is considered in the following constructs; facilitating conditions, performance expectancy and effort expectancy.

The UTAUT and DOI are useful in determining the generalized determinants for technology acceptance. Instruments/studies built solely on the UTAUT and DOI concepts have been successful in generalized settings. In recent times more DOI studies are surfacing in relation to specialized groupings. For example Conci, Pianesi and Zancanaro (2009) on Useful, Social and Enjoyable: Mobile Phone Adoption by Older People. Point in case amongst different groups there are different attributes that need to be targeted for successful DOI. The facilitating conditions, performance expectancy and effort expectancy can differ by groups and these specialized needs along with others need to be considered.

METHODOLOGY

Research Strategy

The scope of this study is restricted to the DTTV adoption at the individual level of analysis. The methodology will take a hybrid qualitative and quantitative approach.

The qualitative approach, which will take the form of focus groups, will allow us to explore the needs of the deaf community. Focus groups tend to be more exploratory and in-depth. The advantages include the opportunity for individuals to be open as they share and comment on each other's experiences and point of view. Also, it is an effective mechanism to understand not only what they think but also how they think and the reasoning behind it (Kitzinger, 1995). The purpose is twofold: (1) to determine what problems deaf viewers currently have with broadcast TV and subscriber TV, (2) to inform them about the impending DSO and to ascertain what factors/features would be important to deaf viewers for them to switch to digital TV. A hearing person who is proficient in JSL will be used for translation purposes and the sessions will be recorded as well as notes will be taken. Based on the uncovered determinants relevant to the deaf population and the three levels of determinants proposed by Klein et al. (2004) (see Table 1) we will formulate a survey to complete the second round of information gathering.

The quantitative portion of the study will entail the use of the survey which will predominantly use a 5 point Likert scale. The aim of the survey is to validate and quantify the impact of the determinants for the overall population in an effort to highlight those specific to the deaf. It is anticipated that the research will commence July 2011 and span a six month period.

Research Sample

The research sample will be comprised of individuals from the deaf population and a similar sample from the hearing community.

The focus groups will utilize a representative sample of 6 deaf adults (from 18 years and older). There will be three focus group sessions stratified by age; young adults (18-29), matured adults (30-49) and senior adults (50 and over). In each group there will be 1 representative from each of the segments proposed by Klein et al. (2004), see Table 1.

For the survey data collection, a stratified sample will also be used. Criteria for each stratum will be clearly identified to associate individuals with a category from the individual innovativeness theory. Approximately 250 adults will be surveyed with a representative age distribution from the population.

Data Analysis

For the focus group aspect, analysis of the data will be done during and after data collection to take advantage of opportunities to follow up on insights before interviewing is completed and to draw insights from the entire corpus of data (Mick & Fournier, 1998). The data/sentences will be evaluated for meaning and then given a code; the codes will then be

merged into categories of determinants to be used in the survey and to create the research model. The initial data will also be evaluated to identify measures to mitigate the negative and leverage the positive determinants. Data collected from the survey will be analyzed using relevant statistical techniques. Hypotheses will then be developed, regarding adoption of DTTV in the deaf community, from the statistical analysis and the formulated research model. These will be validated and quantified using structured equation modeling.

CONCLUSION, IMPLICATIONS AND FUTURE RESEARCH

A number of countries are in the early stages of the DSO revolution, a process which will have universal impact on persons who view digital media. Companies are rushing to capitalize on the opportunities that are possible. In early 2010 it was announced that Google, Intel and Sony have teamed up to deliver a new platform - Google TV - to a new generation of TVs and set-top boxes. Based on Google's Android operating system, Google TV will run on Intel's Atom chips. There will be a new interface that allows viewers to seamlessly move from live TV to YouTube videos. While possibilities and opportunities abound, the digitally challenged and marginalized groups run the risk of being further marginalized.

The few studies that have looked at marginalized groups all have a common recommendation, that is, it is paramount to protect vulnerable groups at switchover. These studies have all been done in economically advanced countries and do not necessarily reflect the reality in developing countries. In Jamaica for example the regulatory body has already indicated that there will be no incentives. This point suggests a clear dichotomy among different socio-economic markets. Hence conducting the research in Jamaica will be of value for other developing countries with similar socio-economic and infrastructural frameworks. This study therefore seeks to identify the determinants to the adoption of DTTV, in the absence of incentives. The base theory for this research is the Unified Theory of Acceptance and Use of Technology (UTAUT) and the methodology involves both qualitative and quantitative approaches. A research model will be developed by modifications to the base UTAUT model based on the determinants uncovered. The target population for this research is deaf persons which will be compared to the normal population.

It is anticipated that data from this study will help to advise regulators on the strategy to improve the uptake of DTTV to these marginalized groups that runs the risk of being even more marginalized when DSO actually takes place. It will also help to advise marketers on strategy, communications channel, placement, and content in reaching these groups.

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